

# FLIGHT

The  
AIRCRAFT  
ENGINEER  
&  
AIRSHIPS

First Aero Weekly in the World

Founder and Editor: STANLEY SPOONER

A Journal devoted to the Interests, Practice, and Progress of Aerial Locomotion and Transport

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## Flight

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### DIARY OF FORTHCOMING EVENTS

Club Secretaries and others desirous of announcing the dates of important fixtures are invited to send particulars for inclusion in the following list:—

1925

Jan. 22	Major R. V. Southwell, A.F.R.Ae.S. (Superintendent, Aerodynamics Department, National Physical Laboratory): "Some Recent Work of the Aerodynamics Department, N.P.L.," before R.Ae.S.
Jan. 23	Lieut. N. A. Olechnovitch, Member: "A Few Experiments with Shock-Absorbing Hulls for Flying Boats," before I.Ae.E.
Feb. 5	Air Commodore C. R. Samson, C.M.G., D.S.O., A.F.C., A.F.R.Ae.S.: "The Operation of Flying Boats in the Mediterranean," before R.Ae.S.
Feb. 12	Colonel F. Searle: "The Maintenance of Commercial Aircraft," before R.Ae.S.
Feb. 19	Lieut.-Col. L. F. R. Fell: "Light Aeroplane Engine Development," before R.Ae.S. (Society of Arts).
Feb. 20	Professor E. G. Coker, D.Sc., F.R.S.: "Photo-Elastic Methods of Measuring Stress," before I.Ae.E.

## EDITORIAL COMMENT.



THE December issue of the Bulletin of the *Fédération Aéronautique Internationale* just received contains a complete list of world's records homologated up to December 31, 1924. Not a single world's record now stands to the credit of Great Britain. If it were not for the fact that it might attract rather too great attention abroad, we should like to publish this sentence in bold black type at the bottom of each page of FLIGHT until the statement was no longer true. We are aware that the view is held in certain quarters that these world's records do not matter. That opinion we do not share. World's records do matter; in fact, they matter a very great deal. It may be true that the establishment of a world's record does not, as a rule, result in the firm who established it receiving orders immediately for their machines. It was, we think, M. Laurent Eynac who once said that the world's record is the publicity of a nation's aircraft industry. That is absolutely true, but, as in other forms of publicity, consistent and persistent advertising is necessary in order to give and maintain results. How have the great business houses of this country, or of any country, for that matter, been built up? Not by one isolated advertisement at the start of their career, but by regular and widespread publicity, until the particular commodity advertised had so impressed itself upon the public mind that whenever the article was required none but the advertised one came to mind. In fact, we would go farther than M. Laurent Eynac, and say that the world's record is more than a "publicity stunt." It is the absolute and definite proof that the machine and engine, not forgetting the pilot, are capable of that particular performance in which the machine excelled, and the "publicity" value is so enormous because the F.A.I. record is recognised in all civilised countries.

Does it not stand to reason that if one particular nation holds the world's records for speed, altitude, distance, duration, weight-carrying, etc., that nation possesses machines which are unexcelled in those functions? To us it appears obvious that this must

be the impression left upon the rest of the world. Altogether 77 different world's records are recognised. These are for heavier-than-air craft only, and do not include balloons, airships, gliders, and helicopters. In other words, they refer to aeroplanes and seaplanes only. Out of the 77 the United States hold 53, France 14, Denmark 5, and Czechoslovakia 4. These figures are illuminating, and we fear somewhat humiliating to Great Britain. When small countries like Denmark can establish world's records the excuse that we cannot "afford" to trouble about them scarcely holds good. Rather would we say that Great Britain can no longer afford not to attack some of the existing records.

It is not as if it were quite hopeless for a British machine to beat any of the present world's records. As a matter of fact it is far from hopeless, and it may come as surprise to many of our readers to be told that there are in existence at the present time British machines which are establishing world's records almost weekly in their normal routine work. These are service machines, and the work they carry out is done by service pilots in the ordinary course of their duties. Would it not be policy on the part of the Air Ministry to permit such performances to be officially observed in order that they might be recognised by the F.A.I.? The cost would be insignificant, as the machines are already flying, and a few such records could hardly fail to be of very considerable benefit to the British aircraft industry in general, and certainly to the particular manufacturer whose machine was used.

When France realised, a year or more ago, that practically all the world's records worth having had gradually been acquired by the United States, M. Laurent Eynac decided to offer a substantial premium to the manufacturers of any aeroplane or seaplane which brought back one of the main world's records to France. What has been the result? That during 1924 quite a number of the really important records, such as speed, altitude, and duration were brought back to France. Before the War it was, we believe, the rule in Germany that any pilot who held a world's record was entitled to a certain sum monthly or annually *so long as he retained the record*. That was a very practical form of encouragement, and a pilot who held a record was naturally very keen to retain it. If it was beaten he was anxious to regain it, and if some such system were introduced in this country—for instance, by combining the French and German arrangement and rewarding both the constructor and the pilot—we have not the slightest doubt that a good many world's records would very soon stand to the credit of Great Britain.

The money required to "put England on the Map" again would not be a vast amount, as public expenditure goes these days, and in any case it would prove an excellent investment. We have repeatedly called attention to the advantages gained by attacking world's records. The constructors, the pilot, the engine makers, and in fact all concerned in the attempt learn a very great deal from their experience, knowledge which cannot fail to improve both the machine and the engine. To take the most obvious example, the world's speed record. Will anyone seriously challenge the statement that in designing, building and flying the Bernard "Ferbois," which holds the record with a speed of 280 miles per hour, the French have gained experience which will be invaluable to them in the design of fast single-seater fighters? We

think not. Again, to take a less obvious case, the distance or duration records demand, although it may not be very generally realised, a machine with a good maximum L/D ratio, since the power required for cruising at this ratio must be low in order to give the necessary fuel economy. We might quote the example of the "Breguet XIX," flown by Pelletier d'Oisy from France to China. The machine has not, it is true, established a world's record yet, but the main reason why d'Oisy was able to get through as far as he did and in such short time was undoubtedly that his machine had a high cruising speed, and a good L/D ratio at that speed. Incidentally it may be recalled that an attempt is to be made to fly from Paris to Dakar on one of these machines, a distance of approximately 3,250 miles. Similarly, the machine which transports the greatest load over the greatest distance will obviously have its uses both in commercial aviation and as a bomber, for instance, or if not the actual record machine at any rate a development of it. One could go on enumerating the very direct benefits to be derived from attempts at world's records, but we think sufficient has been said to indicate that the present position of Great Britain in the matter of world's records has become intolerable and must be rectified without delay.

#### Associate Fellowship of the R.Ae.S.

It must, we think, be admitted that there has been a certain amount of difficulty in connection with the acceptance, by the Council of the Royal Aeronautical Society, of applications for Associate Fellowship, especially as regards a certain number of people with long experience in the aircraft world who have not until comparatively recently desired to join the Society. Briefly, the position is this that the Royal Aeronautical Society, quite rightly, desires to raise the standard of Associate Fellowship to at least the equivalent of that of other institutions, and to this end has instituted certain examinations that have to be passed by applicants for Associate Fellowship.

Now, there are undoubtedly many at present working in the aircraft industry, with very many years' practical experience, who did not for various reasons become Associate Fellows of the R.Ae.S. in its earlier days, and who now feel themselves incapable of, or unwilling to, sit for the Society's examinations. The alternative of presenting a thesis is also regarded by many as a serious obstacle, as many have been under the impression that a thesis should be of a mathematical character or be an account of some special research work. This is not necessarily the case, and under the official notices of the R.Ae.S. this week will be found a brief statement of the position. It will be gathered that the society is willing to regard with every sympathy applications for exemption from the examinations by those of long experience in aircraft work, and we feel sure that with a little goodwill on both sides many who are now rather hesitating to fill up the application form will have no cause to delay. It is so obviously to the advantage of the society to gather in men with long practical experience that such exemptions should, after due consideration of individual cases, be granted as a right rather than as a favour. Nor would, we think, the dignity of the society suffer in the slightest. After all is said and done, it is mainly on the foundation of the practical work of such men that the theories which now deter them have been established.



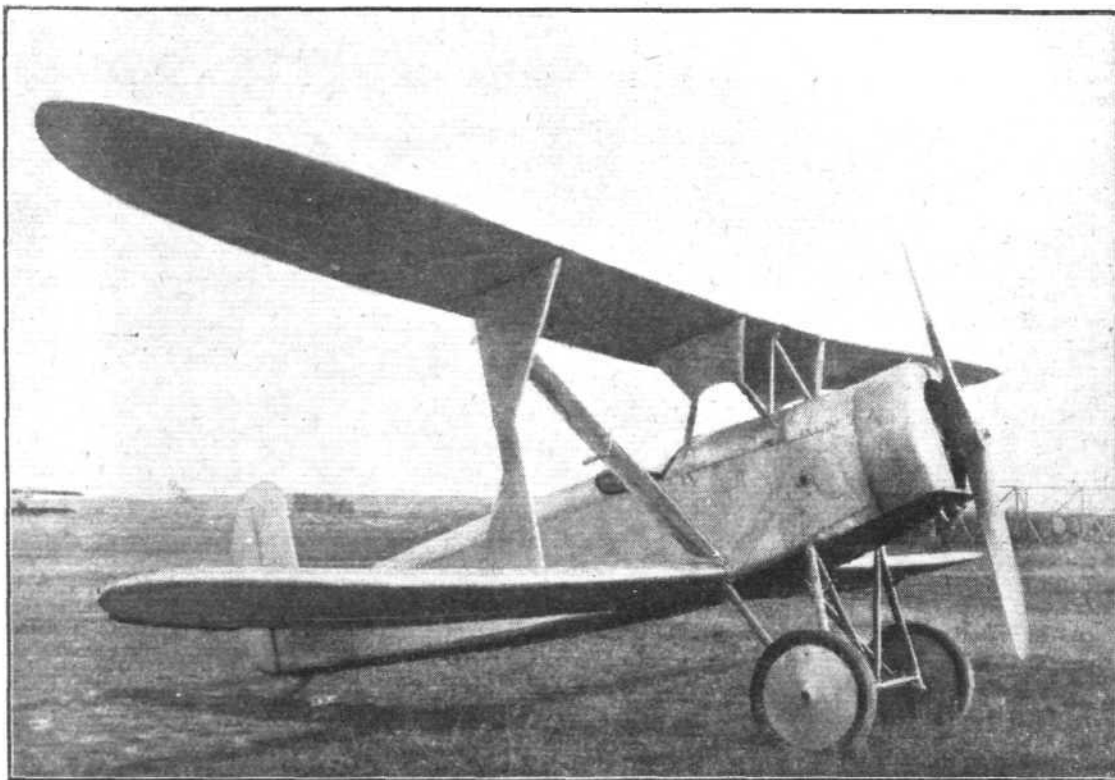
## THE FEIRO "DONGO"

### A Hungarian School Machine of Unorthodox Design

In our issue of February 14, 1924, we published an illustrated description of the first aeroplane to be built by the Hungarian firm of Feigl and Rotter, of Budapest, a four-seater monoplane with rotary engine, and known as the "Feiro I." This firm has now produced another machine to the design of Herr Ludwig Rotter, this time a biplane, which is shown in the accompanying illustrations. The objects aimed at in the

siderable structural problems had to be solved before such a biplane structure became a practical possibility may be taken for granted, but the designers are confident that they have solved these problems, and that no trouble need be feared from twisting wings. Unfortunately, very little information is available concerning the details of the wing structure, beyond the fact that three-ply construction has been exten-

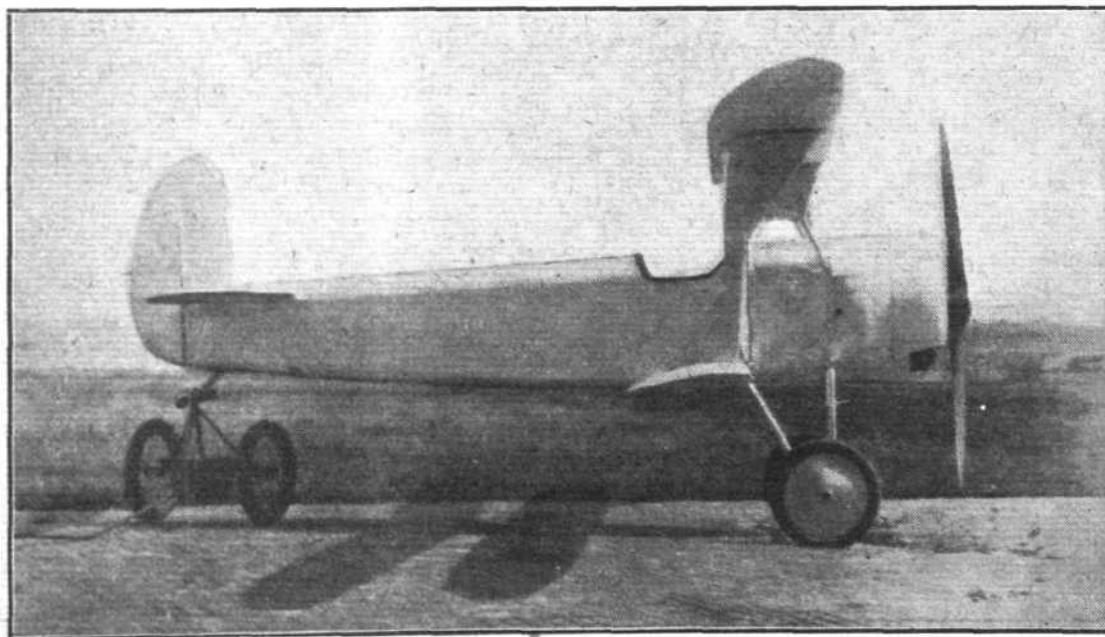
The Feiro  
"Dongo" school  
machine: Three-  
quarter front  
view. Note the  
X-struts.



design of the new Feiro machine "Dongo" (the name, we believe, means gadfly) were: best possible view, safety, and aerodynamic efficiency. The latter resulted in the adoption of wings of large span and very narrow chord, and one might be forgiven for describing the Feiro "Dongo" biplane structure as aspect ratio gone mad, that of the upper plane being no less than 16.9 (span 11.5 metres and mean chord 0.68 m.). However, aerodynamic efficiency was not the only object of this arrangement, as it has served to give, in addition, a particularly good view and, it is claimed, a great amount of stability owing to the small travel of the centre of pressure on a chord of about 2 ft. 3 in. That very con-

siderable structural problems had to be solved before such a biplane structure became a practical possibility may be taken for granted, but the designers are confident that they have solved these problems, and that no trouble need be feared from twisting wings. Unfortunately, very little information is available concerning the details of the wing structure, beyond the fact that three-ply construction has been exten-

sively employed. The plan view of the general arrangement drawings gives some idea of the spar positions, which are placed unusually close to leading and trailing edges, but otherwise detail information is lacking. That the "Dongo" is of more than usual aerodynamic efficiency is apparent from the vector curve published herewith. The coefficients given, it should be pointed out, are our "absolute" coefficients multiplied by 20. The maximum lift coefficient is approximately 0.68 abs., and the maximum L/D, which occurs at a negative angle of about half a degree, is in the neighbourhood of 15. For a machine with orthodox undercarriage, and with biplane cellule at that, this figure



The Feiro  
"Dongo" school  
machine: This  
side view gives  
a good idea of  
the pronounced  
stagger.

can only be described as exceptionally good, the more so as the two seats are arranged side by side in order to make the machine more "sociable" for touring and especially suitable for school work.

As already mentioned, in designing the "Dongo," Herr Rotter desired to afford the occupants a good view, and at the same time he wanted to keep the machine as efficient as possible so as to get a good performance with small power output. By choosing a very narrow chord and heavily staggering the planes, he was able to avoid any cut-out in the trailing edge of the top plane, a feature of most "orthodox" biplanes and one which in the opinion of the designer of the "Dongo" is detrimental to efficiency. The pronounced stagger (very nearly equal to the chord) has further been employed to give longitudinal stability by setting the top plane at a positive angle of incidence of 2 degrees and the bottom plane at 0 degree incidence. It is claimed that by this arrangement sudden stalling is avoided.

The safety of the occupants is thought to be assured by the strong steel-tube cabane upon which the top centre-section is mounted. Should the machine turn over on the ground, it is thought that this cabane would stand up to any reasonable shock. Incidentally, it might be mentioned that the cabane is provided with means of altering both the angle of incidence and the stagger.

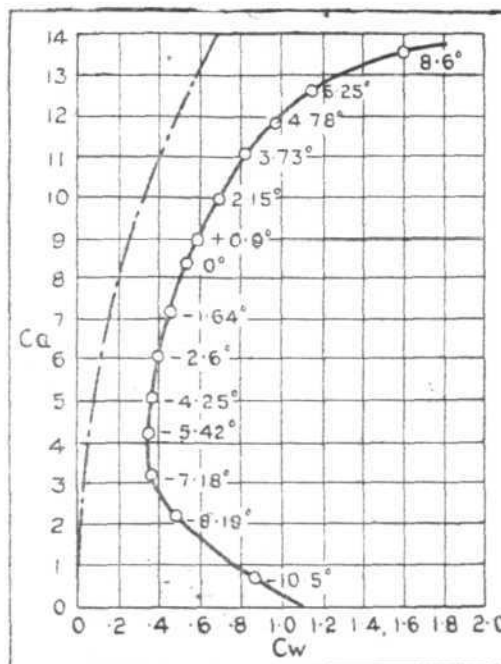
The single inter-plane struts are of "K" or rather of "X" formation, the main strut running from bottom front to top rear spar, and the diagonal members of the built-up strut running to rear and front spars respectively. The lift bracing is in the form of a single steel tube on each side, working both in tension and in compression, twisting stresses being taken by the inter-plane struts. Ailerons are provided on the bottom plane only, and are stated to have proved to give ample controllability.

The fuselage is of the flat-sided type, with rounded top and bottom fairings, and as already mentioned, the occupants sit side by side, so that the fuselage is necessarily somewhat wide (3 ft. 11 in.). Dual controls are provided, the set on one side being readily removable. An engine of 60 h.p. had been contemplated, but as one was not available when the machine was finished a larger engine of the rotary type was installed and was throttled down from 1,250 r.p.m. to 1,050 r.p.m., in order to represent the engine for which the machine was designed. At the reduced revolutions, this engine and airscrew combination was estimated to give exactly the equivalent of the 60 h.p. engine, although the extra weight naturally affected the performance somewhat adversely.

The rotary engine is mounted on an all-steel structure in the nose of the machine, and the engine housing is separated from the cockpit by two fireproof bulkheads. The carburettor, oil pump, etc., are placed in the space between these two bulkheads, and as the air intakes are taken outside the cowling, while the space between bulkheads is well ventilated, there should be very small risk of fire. The petrol tank is placed

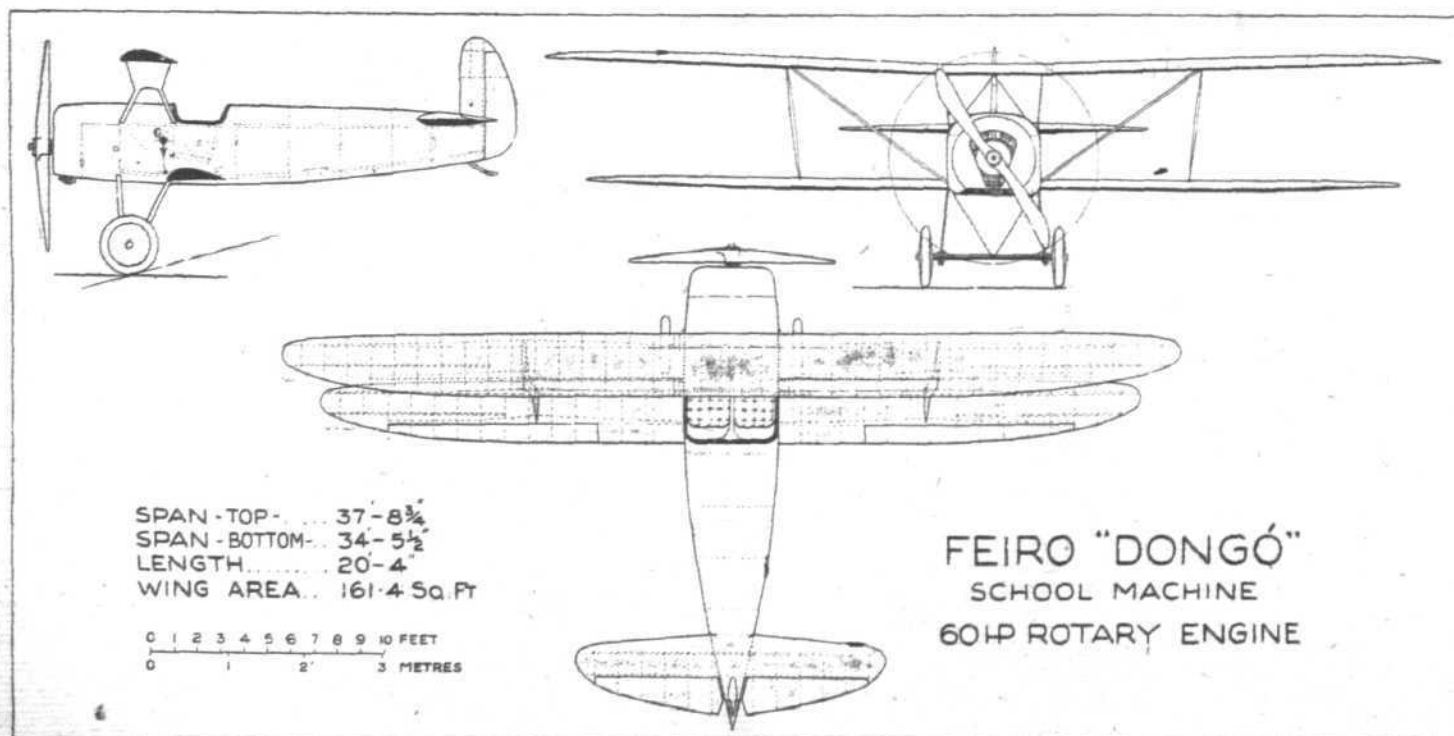
in the deck fairing, aft of the rear fireproof bulkhead and above the cockpit. It gives a sufficient head of petrol to enable direct gravity feed to be employed.

The undercarriage is of fairly normal type, but the wheels are placed rather farther forward than normal in order to reduce the risk of nosing over. In spite of this fact, the tail is stated to come up quickly on opening out the engine, owing probably to the effective tail of high aspect ratio. The forward wheel position might be expected to give the machine a tendency to pitch and bounce somewhat, but we understand that no trouble of this sort has been experienced.



**VECTOR DIAGRAM OF THE FEIRO "DONGO":**  
The maximum L/D ratio occurs at an angle of  $-\frac{1}{2}$  degree and has a value of nearly 16.

The main dimensions of the Feiro "Dongo" are: Length o.a., 6.2 m. (20 ft. 4 in.); span, upper plane, 11.5 m. (37 ft. 9 in.); span lower plane, 10.5 m. (34 ft. 5½ in.); total wing area, 15 sq. m. (161½ sq. ft.). Weight, empty, 450 kgs. (990 lbs.); useful load, 240 kgs. (528 lbs.); total loaded weight, 690 kgs. (1,518 lbs.). Weight per sq. ft., 9.4 lbs.; weight per h.p. (on 60 h.p.), 25.3 lbs. On a test flight, with this loading the "Dongo" got "unstuck" at a speed of 75 km./h. (46.8 m.p.h.) and reached an altitude of 1,000 m. (3,280 ft.) in 5 minutes 40 seconds. The top speed is 165 km./h. (103 m.p.h.)



**A HUNGARIAN SCHOOL MACHINE: General arrangement drawings, to scale, of the Feiro "Dongo."**



# AIR ACTIVITY IN AFRICA

## France and Belgium Forging Ahead

ALL interested in the progress of aerial transport will, during the present year, have a greater part of their attention centred upon Africa, where considerable aerial activity will be taking place from now on. There can be but little doubt that Africa offers immense possibilities as regards aerial transport, for the several big flights that were accomplished last year—D'Oisy's and Zanni's Paris-Tokio, the Dutch Amsterdam-Tokio, etc., to say nothing of the Round-the-World expeditions—have, to a certain extent, cleared up several hitherto unknown factors which have probably been the main cause of holding back big aerial transport schemes in such countries as Africa. Problems relating to tropical conditions in regard to aircraft, and the practicability of long-distance flights over more or less unknown country, are today—thanks very largely to the flights above referred to—matters that should not present any serious difficulty in the way of aerial transport schemes such as those we are about to describe.

For some time past France has successfully been operating certain air services in Northern Africa—*viz.*, those run by the Latécoère firm between Toulouse-Alicante-Casablanca, Marseilles-Alicante-Oran, and Casablanca-Rabat-Fez-Oran; and certain other services between the South of France and Algeria and Tunis. That the Latécoère lines have been successful and have considerably increased their popularity year by year may be gathered from the following figures showing the numbers of letters carried each year since 1919:—(1919) 9,124, (1920) 182,061, (1921) 327,805, (1922) 1,407,352, (1923) 2,958,863, (1924, nine months) 2,817,432. The number of passengers carried has also shown a remarkable increase—in 1921 the number of passengers was 831, the next year it rose to 2,088, and in 1923 to 2,400.

It is hoped that this year will see big developments in regard to these services. In the first place, the Toulouse-Casablanca line will be extended along the west coast to Dakar in French Senegal (opposite Cape Verde Islands), *via* Mogador, Agadir, Cape Juby, Villa Cisneros, Port Etienne and St. Louis. This will form the first stage of an ambitious scheme for the establishment of a regular air mail service

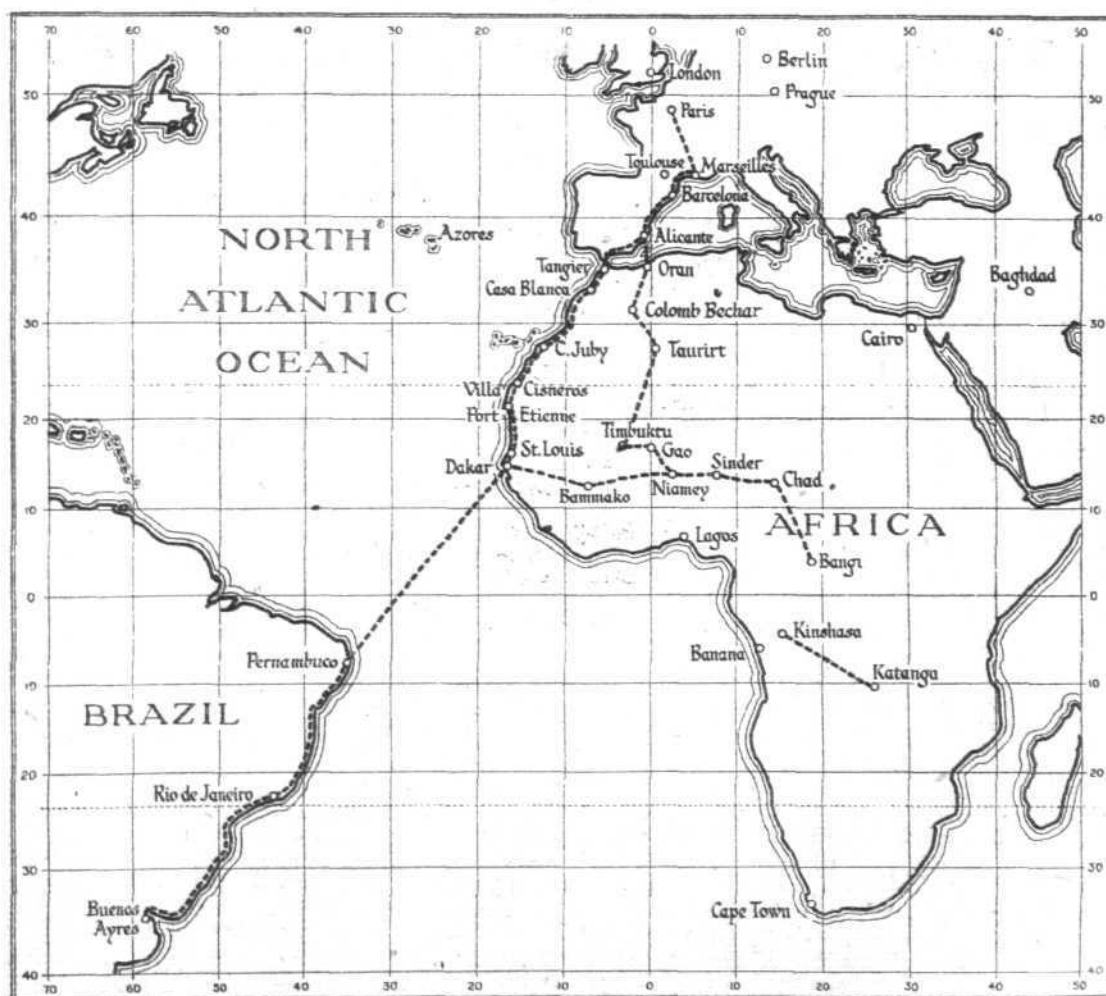
between France and South America. At the moment a mission of French air experts, from the Société Générale d'entreprises Aéronautiques and under Prince Charles Murat, is in South America for the purpose of arranging agreements with the South American Governments concerned for this air service, and also with the object of studying the conditions and requirements connected with such a service.

While eventually it is hoped that the section from Dakar to South America will be operated entirely by aircraft, at present the scheme has not developed sufficiently for any definite plans to be laid down. In all probability, at the start mails will be air borne as far as Dakar, thence they will be conveyed across the Atlantic to Fernando Noronha Island or Pernambuco by fast boats. From here the mails will be taken over once again by aircraft, which will journey along the coast of Brazil, *via* Rio de Janeiro, to Montevideo in Uruguay and then to Buenos Ayres in Argentina.

The crossing of the Atlantic on this section—a distance of about 1,860 miles—is naturally a problem requiring careful consideration and preparation. Large flying boats, it is almost certain, will be employed for this part of the journey, and it has been proposed that in order that the flying boats may alight *en route* in order to take in fuel, huge floating harbours—in the form of a horse-shoe—will be stationed at convenient points between Dakar and the South American coast. These harbours, which would be provided with waiting and refreshment rooms for the passengers, would not be anchored, but would maintain their position by means of power-driven water propellers. This certainly sounds a somewhat fantastic scheme, but we would not care to go so far as to say that it is impracticable, although it is undoubtedly one possessing problems not easily solved.

As regards the South American section, which totals a distance of about 2,750 miles, the French mission previously referred to, has already demonstrated the possibilities of flying over this section by flying, in three machines which they took over with them, from Rio de Janeiro to Buenos Ayres, a distance of over 1,400 miles, in 14 hours.

Aerial Activity in Africa: Sketch-map showing the routes, etc., taken by some of the big aerial schemes planned for 1925 and referred to in the accompanying article.



In order to obtain first-hand information on, and to prepare for, further developments of air communication in Africa itself, the French Government has also organised an important and extensive aerial tour over north-west Africa, to which reference has already been made in *FLIGHT*. This expedition, which started from Buc Aerodrome at 11.45 a.m. on January 18, consists of two four-engined Blériot type 115 biplanes, "Jean Casale" and "Roland Garros," fitted with 180 h.p. Hispano-Suiza engines, the former machine piloted by Col. Vuillemin (who has already made many flights in the Sahara), accompanied by Capt. Dagnaux, Mechanic Richard, and a wireless operator; the latter machine is piloted by Capt. Pelletier d'Oisy, who is accompanied by Col. Goys (chef de cabinet to the Under-Secretary of the Aeronautical Department and leader of the expedition), Adj. Besin (engineer) and a cinema operator. The "Roland Garros" was placed second in last year's Grand Prix for commercial machines, and the "Jean Casale" was third in the 1923 competition and was flown by Bajac on the Paris-London service. Both machines have, of course, been specially overhauled and modified for the expedition.

The route of the tour has been divided into eight main sections and stages as follows (distances in kms. given in brackets) :—

- (A) Paris—Perpignan (800)—Alicante (700)—Colomb Béchar (800).
- (B) Colomb Béchar—Adrar (500)—Ouallen (500)—Tessalit (500)—Gao (500).
- (C) Gao—Niamey (400)—Zinder (800)—Fort Lamy, Chad (700).
- (D) Fort Lamy—Bangui (1,000).
- (E) Bangui—Fort Lamy (1,000).
- (F) Fort Lamy—Zinder (700)—Niamey (400)—Ouagadougou (500)—Bamako (700)—Kayes (500)—Dakar (700).
- (G) Dakar—Port Etienne (700)—Villa Cisneros (400)—Cape Juby (600)—Mogador (600)—Casablanca (400).
- (H) Casablanca—Tanger (300)—Alicante (700)—Perpignan (700)—Paris (800).

The total distance, out and home, is 16,900 kms., or nearly 10,500 miles, and it is expected that the expedition will take two months to accomplish.

In addition to the above big flight it is probable that an attempt will be made shortly at a non-stop flight from Paris to Dakar. On this flight a Breguet 19 A2 machine, similar to D'Oisy's Paris-Tokio 'bus, but fitted with a Renault engine, will be employed, and Capt. Lemaitre and Lieut. Arrachart will undertake the attempt.

France, however, is not the only country that will be developing air services in Africa this year, for Belgium also will launch upon a big scheme in Belgian Congo. Belgium, too, in a small way, has been operating air services in this part of Africa for some time past, with, we believe, fairly successful

results. This year the services are to be considerably extended, with the object of improving the at present somewhat inadequate and difficult communications with the interior of Belgian Congo.

It is proposed, therefore, to operate an air line extending from Kinshasa—the capital of Belgian Congo, near Leopoldville, some 250 miles from the coast—to Katanga, in the interior, a total distance of 1,860 kms. (1,156 miles). The main traffic on this route, it may be mentioned, will consist of diamonds, gold and ivory, and it is expected that the transport of these from the interior to the capital by air will be effected in a single day, as against the week or more involved under present methods of transport. The operating company is known as "SABENA."

The route, which is for the most part over very difficult territory, is divided into two main sections: Kinshasa—Luebo, a distance of 850 kms. (528 miles), and Luebo—Katanga, 1,010 kms. (628 miles). On the first section no fewer than 25 aerodromes or emergency landing grounds have already been constructed—many in swamps and jungles. It may, perhaps, be of interest if we give a list of these aerodromes with the distances (in kilometres) between each. They are as follows:—Kinshasa—Kimpoko (26)—Mambutu (40)—Langa Langa (30)—Kunsulu (40)—Kwamouth (28)—Lediba (32)—Bokala (45)—Bandundu (35)—Dima (17)—Kasa Yenda (35)—Kilimuana (45)—Mabenga (45)—Eolo (40)—M Panu (30)—Manghay (40)—Lubue (46)—Pangu (20)—Sungula (48)—Ilebo (32)—Pegiangou (38)—Domiano (40)—Ibange Kakesse (30)—Kalamba (40)—Luebo (28). Practically the whole of this route follows river country—the Congo River and its branches, Karsai, Lubefu, etc.

Perhaps the most gratifying feature of this service is in the machines to be employed. Some time ago a special competition was held by the Belgian authorities in order to decide upon the best type of machine for the work, as a result of which success fell to Messrs. Handley Page, Ltd., and their new three-engined biplane. This machine, which was described in *FLIGHT* for May 1 last, is fitted with one Rolls-Royce "Eagle IX" in the nose of the fuselage, and two Armstrong Siddeley "Pumas" on the wings. One of these machines was delivered some time back, and six others are nearing completion.

In connection with this Belgian scheme, plans are being prepared for a big flight from Brussels to the Congo. This will be undertaken by the pilot Thieffry, who will follow the same route as the French expedition to Bangui. We have not, at the time of writing, any further details of this flight.

In conclusion, we are forced to ask the question, What about Great Britain? There have been rumours of an official flight from England to Cape Town—but only rumours. However, the South African Government has decided to start a 1,000-mile experimental air mail service between Durban and Cape Town—so that's that!

## ROYAL AERONAUTICAL SOCIETY

### Qualifications for Associate Fellowship.

In view of doubts which appear to exist as to the qualifications required from candidates for Associate Fellowship of the Royal Aeronautical Society, the Council consider it advisable to issue the following statement as to their interpretation of the Regulations.

The Regulations provide for the election to Associate Fellowship of:—

- (a) Those who pass the Society's own examination, or possess an equivalent University or Technical College qualification, followed by two years' practical experience in the application of the science of aeronautics.
- (b) Those who present a Thesis.
- (c) Those who have very exceptional qualifications or achievements, but do not possess the examination qualifications outlined in (a).



### Photographing the Eclipse from Aeroplane

ARRANGEMENTS have been made by the Canadian Royal Air Force for an attempt to take photographs of the eclipse of the sun on Saturday from aeroplanes, which will, if necessary, fly above the clouds to do so. Prof. Peters, astronomer of the U.S. Naval Observatory at Lakehurst, N.J., also hopes to obtain photographs of the eclipse from the U.S. airship "Los Angeles" (Z.R.3).

In regard to (a) the Council accept the degree or diploma of any recognised University or Technical College at home or abroad, and excuse from the Aerodynamics paper of the Society's own Examination holders of Diplomas in Aeronautics of such Universities or Technical Colleges.

In regard to (b) the Council do not insist upon a thesis necessarily being a record of original work, but require it to be of such a nature as to give an adequate idea of the Candidate's knowledge and experience in aeronautics or an allied subject applied to aeronautics.

Under the heading (c) the Council have accepted pilots of rigid airships, and aeroplane test and experimental pilots whose work has been, or is likely to be, of value to the progress of technical development. They also have accepted long-standing workers in any branch of aeronautics whose experience entitles them to be considered as "Pioneers." In considering applications under this heading it is not possible to lay down any hard and fast rule, but each case must be considered individually on its merits.

### Sir Sefton Brancker Ill

SIR SEFTON BRANCKER, Director of Civil Aviation, who recently flew to India in a D.H.50 (Siddley "Puma") piloted by Alan Cobham, for the purpose of arranging matters in connection with the Imperial Airship service to India, was taken ill with fever at Calcutta, and had to be removed from Government House to hospital. His condition, however, is not serious, and he hopes to resume his flight to Rangoon soon.



# The Royal Aero Club of the United Kingdom

OFFICIAL NOTICES TO MEMBERS

## COMMITTEE MEETING

A MEETING of the Committee was held on January 14, 1925, when there were present: Lieut.-Col. F. K. McClean, A.F.C., in the Chair; Mr. Ernest C. Bucknall, Lieut.-Col. M. O. Darby, Brig.-Gen. Sir Capel Holden, K.C.B., F.R.S., Col. F. Lindsay Lloyd, C.M.G., C.B.E., Mr. F. Handley Page, Air-Commodore C. R. Samson, C.M.G., D.S.O., R.A.F., Mr. T. O. M. Sopwith, and the Secretary.

**Election of Members.**—The following new members were elected:—

Flying Officer Ernest James Henry Wright.  
Flying Officer Christopher Ayling.  
Pilot Officer Anthony Cecil C. Mason.  
Donald Herbert Drew.  
Squad-Leader Charles Henry Elliott-Smith.  
The Hon. Geoffrey Cunliffe.  
Lieut.-Com. George Evelyn Paget How, R.N.  
Flight-Lieut. Cuthbert Joseph Stanley Dearlove.  
Flying Officer Roger Pierre Mollard.  
Flying Officer George Anthony Fielding Bucknall.  
Redvers Michael Prior.  
Flying Officer Percival Phillips.  
Flying Officer Robert Linton Ragg.  
William Waldron Saunders.

**Light Aeroplane Section of the Royal Aero Club.**—Lieut.-Col. M. O. Darby and the Secretary reported that the response to the recent circular issued to those interested in the London District had been most satisfactory. The Air Ministry Scheme, however, would require to be modified, and the deputation from the Club which was received by the Under-Secretary of State for Air on December 16 last had made proposals in regard to certain clauses.

Letter was read from the Air Ministry dated January 7, 1925, intimating that the Air Council would be prepared to allow the Club the use of Hendon Aerodrome for the Light Aeroplane Section for one year.

**Automatic Time Recording Instruments for Speed Records.**—The following were appointed to represent the Club on the Air Ministry Committee:—Lieut.-Col. M. O'Gorman, C.B.; Maj. R. H. Mayo, Lieut.-Com. H. E. Perrin.

**Air Races at Hendon.**—Letter was read from the Air Ministry dated January 6, 1925, giving permission for an aviation race meeting to be held at the London Aerodrome, Hendon, at the end of June following on the Aerial Pageant.

**Annual General Meeting.**—It was decided to hold the Annual General Meeting of the Club on Wednesday, March 25, 1925.

**Honorary Membership.**—The following Honorary Members were elected for the year 1925:—

*United States.*—Commander J. H. Towers, Maj. Davidson, Commander Hunsaker, Capt. McNamee.

*France.*—Commander Sable.

*Italy.*—Capt. Scaroni.

*Switzerland.*—Henri Martin.

**Club Premises.**—Certain alterations to the Club premises to provide more accommodation for the members were approved and ordered to be put in hand at once.

**Sub-Committees.**—Reports from the following Committees were received and adopted:—House Committee; Racing Committee; Joint Standing Committee (R.Ae.C. and S.B.A.C.).

## FÉDÉRATION AÉRONAUTIQUE INTERNATIONALE

LIEUT.-COL. M. O'GORMAN, C.B., and Lieut.-Com. H. E. Perrin, the Club representatives at the Conference of the F.A.I. held in Paris on December 17-19, 1924, submitted the following report:—

**Conference, 1925.**—This was fixed to be held in Prague on September 19-28, 1925.

**Schneider Race, 1925.**—It was decided that the Regulations should be the same as in 1924.

**Customs Carnet for Touring Aircraft.**—It was reported that the following countries had adopted the Carnet:—Belgium, France, Great Britain, Italy, Holland, Rumania and Switzerland.

Subject to the Exchange of Guarantees, the Carnet would come into force on April 1, 1925.

**Seaplane Records.**—The Regulations for the three kilometre Greatest Speed Record for Seaplanes were drawn up.

**Height Records.**—The following Regulations come into force on April 1, 1925:—

The checking of the height attained shall be done at the F.A.I. standard temperature of the atmosphere at the top of the climb.

Owing to vibration the curve of the Barograph Chart is frequently thickened, and the height attained will be taken as the horizontal tangent at the lower side of the curve.

**Insurance.**—The F.A.I. Committee met the Insurance Commission and discussed international insurance as applied to touring aircraft. An International Commission was appointed to examine the various laws of each country and report.

Offices: THE ROYAL AERO CLUB,  
3, CLIFFORD STREET, LONDON, W.1.  
H. E. PERRIN, Secretary

## LIGHT AEROPLANE CLUB DOINGS

WE shall be pleased to have reports regularly from Club Secretaries, or those directly connected with new Light Plane Clubs, so that by keeping our readers informed on this matter the whole movement may be helped forward to the benefit of the clubs and the popularising of "that Air feeling."

We have received the following report on the progress being made:—

**Midland Aero Club.**—The Midland Aero Club, which was formed in 1909, has now been officially appointed by the Air Ministry as the authority for control of the Air Ministry Light Aeroplane Scheme in the Midland area. The Club is now being reorganised, and the Lord Mayor of Birmingham (Alderman P. Bower) has consented to become President, and the following gentlemen have become Vice-Presidents: Rt. Hon. Austen Chamberlain; Rt. Hon. Neville Chamberlain; Lieut.-Col. L. C. S. Amery; Arthur Brampton, Esq.; Sir Herbert Austin, K.B.E.; Sir David Brooks; Sir Charles Hyde; W. Ballin Hinde, Esq.; Sir Edward Iliffe, C.B.E.; F. W. Lancaster, Esq.; Sir William Mills; Francis H. Pepper, Esq.; Alderman H. J. Sayer, J.P.; Alderman T. O. Williams.

Many readers in the Midlands will remember the very successful meetings which were organised by the Club in pre-War days, the principal of which was the first All-British Aviation Meeting, held at Dunstall Park in May, 1910, when such famous names as C. S. Rolls, Moore-Brabazon, Cody,

and Rawlinson figured on the competitors' list. Successful flying meetings were also organised at the Club grounds at Castle Bromwich, which during the War were converted into one of the principal Air Force aerodromes.

In the Club hangars at Wolverhampton much interesting early construction and development work was carried out, and even in those early days members possessed their own machines, which were regularly flown.

Since the War the Club has organised for the Royal Aero Club at Castle Bromwich "controls" in connection with the various long-distance races, such as the King's Cup and Grosvenor Cup. These meetings were very popular and exceedingly well attended, and gave ample proof of the interest existing. Since the advent of the Air Ministry Light Aeroplane Scheme the Club has received a large influx of new members, a large proportion of whom possess expert knowledge and experience gained in the Air Force, and it is anticipated that the Club will obtain very live and enthusiastic membership.

The annual subscription is fixed at £1 1s. for the first 500 members, after which there will be an entrance fee of £1 1s. Ladies and boys under 18 are admitted at a subscription of 10s. 6d.

The Club is in negotiation for the acquisition of machines, and it is anticipated negotiations at present in progress for the use of the Castle Bromwich aerodrome, with the consent of the Air Ministry, will materialise at an early date.

# THE AEROMARINE EO SPORT FLYING-BOAT

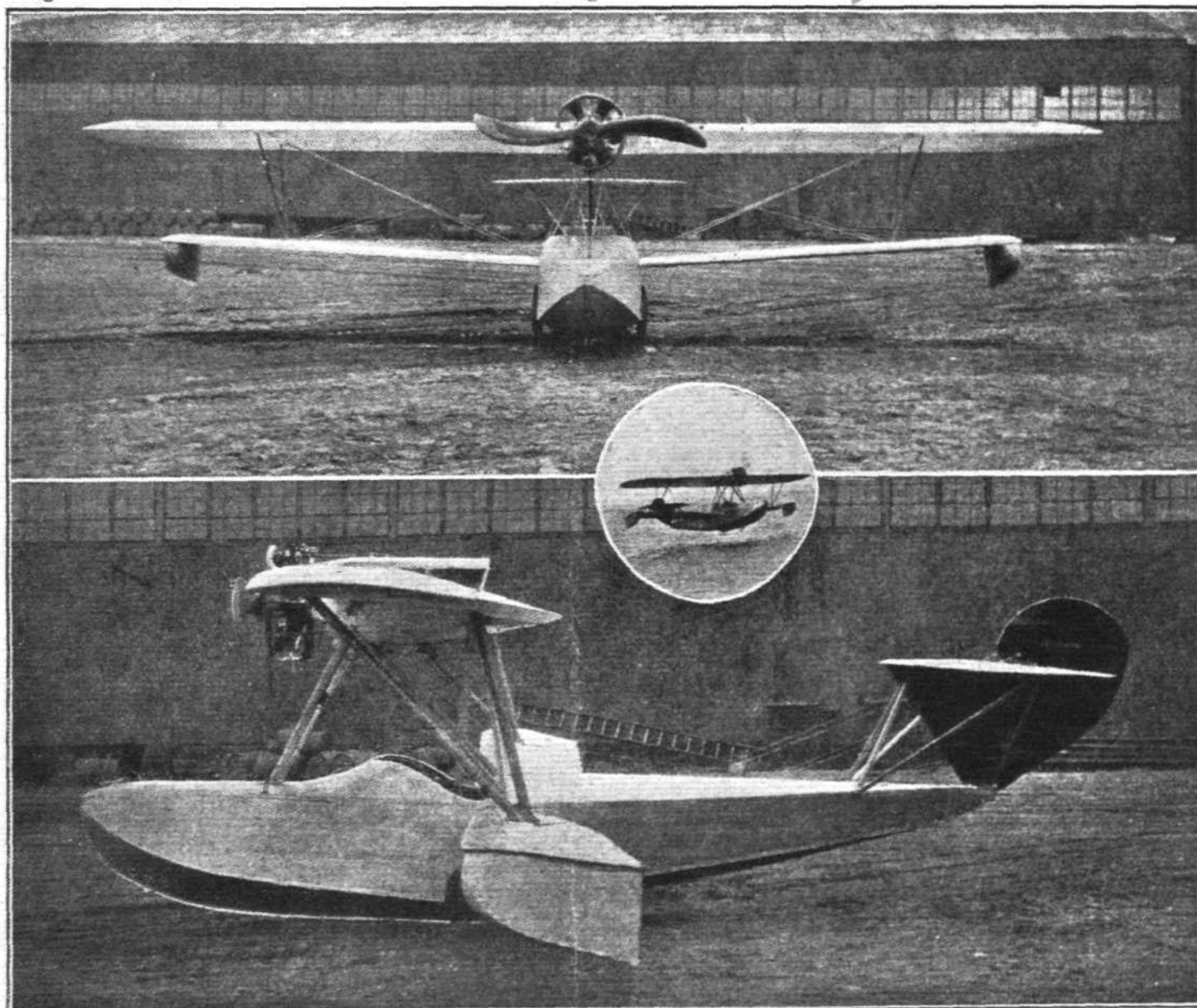
A LITTLE while back the Aeromarine Plane and Motor Co., of Key Port, N.J., completed a small metal-hull flying-boat possessing several very interesting features, and we give below a description, together with illustrations, of this machine.

This flying-boat has been specially designed for Mr. E. D. Osborn, who was formerly associated with Aeromarine Airways, to take the place of his older Aeromarine Model 44 flying-boat. While the new model EO was built around a smaller engine in order to reduce petrol consumption and

opening of throttle, and with pilot only was off the water in 15 seconds, and with two passengers in 20 seconds. As a large-size air-screw was fitted, the engine speed did not exceed 1,390 r.p.m. (corresponding to 72.5 h.p., according to maker's power curve).

Tests over the speed course, with two up, showed a high speed of 73.5 m.p.h., and the speed at minimum throttle setting (1,010 r.p.m.) was 40.5 m.p.h.

The Aeromarine EO is a tractor biplane having a lower plane of considerably smaller chord staggered some way back



THE AEROMARINE MODEL EO SPORT FLYING-BOAT: Front and side views and, inset, in flight. It is fitted with a 70-80 h.p. Anzani 6A3 engine.

give improved maintenance, it was required to carry the same useful load and have the same—if not better—performance as the older boat. It was also required that special consideration should be given to the question of safety, as this was rightly held to be an important factor should this model be put into production (as it probably will), not only for sport purposes, where the owner will also be the pilot, but for training work as well.

Special attention was to be given to the matter of balance with and without passengers, and with power on and off—a somewhat troublesome problem as far as flying-boats are concerned. Designs for the EO, embodying these requirements, were completed early last year, and the first tests were made, Mr. Osborn piloting himself, in June last. During these tests the machine fulfilled all the requirements called for, especially as regards balance. Tests were made with pilot only, with one and with two passengers, and the balance was found satisfactory in each case, while the flying qualities seemed to be but little affected by the amount of load carried. In all tests the boat was on step in four or five seconds after

of the top plane—below the trailing edge of the latter. The wings are of wood and fabric construction, while the engine, petrol and oil tanks, with all accessories, are mounted in an aluminium-alloy nacelle supported on struts above the hull, to which struts are also hinged the top wings. All nacelle, interplane and tail struts are of streamline-steel tubing.

Several advantages are claimed for the tractor-screw arrangement, most important of which being the question of safety. In this respect there is little danger of anything from the cockpit fouling the air-screw, while in the event of a crash the danger of the crew being pinned under the engine is considerably minimised. Incidentally, the position of the cockpit far back in the EO also makes for safety in the event of a crash. Another advantage is that in the case of any leakage in the petrol system there is less danger of the petrol falling on the hot exhaust or engine, and thus causing a fire.

Apart from the question of safety, however, the tractor-screw arrangement allows for better cooling and improved efficiency and reliability in consequence, while it also enables



the pilot and passengers to be located at the centre of gravity, thus improving and simplifying the balance of the machine. In this connection, also, the tail surfaces get more pronounced downwash, a feature considered to be desirable in the case of flying-boats.

For the present a six-cylinder Anzani type 6A3 engine is fitted, as there are not yet any engines of this type made in America, but provision has been made in the design of the engine installation for the fitting of any radial engine of about the same weight and horse-power.

In general construction and design—apart from the arrangement of the power plant and the pronounced stagger—the model EO follows Aeromarine practice. The wings are built up of spruce I-section spars, with spruce trussed ribs and spruce drag struts. All the fittings, of which there are comparatively few, are of steel. Owing to the large stagger the drag bracing in the top plane is double as far as the strut fitting. The lower plane has a single spruce and plywood box spar, which is attached to a steel tube passing through the hull and interconnecting the port and starboard panels. The attachments at this tube and at the outer V-struts are designed so as to resist any torque that may be produced in the wing panel at high speeds or during a dive. Provision is also made in the strut attachments for adjusting the angle of incidence of the lower plane, either for varying the fore-and-aft balance of the machine or for balancing the propeller torque. Aeromarine No. 2B wing section is employed for the top plane, and Aeromarine No. 6 for the bottom.

Long and narrow ailerons are fitted to the top plane, and the control is so designed that pulleys are entirely eliminated, and all cables run in straight lines without any guides or fairleads. The control stick is connected by push-and-pull rod with the countershaft located at the rear of the seat, while the lever on the countershaft is connected by cables with the control horns on the elevators. The stick itself is mounted on a torque tube running fore and aft in the hull, and carrying the lever for operating the ailerons. The latter are provided with extension torque tubes, at the inner ends of which, alongside the engine nacelle, are crank levers, which in turn are connected by streamline push-and-pull rods to the torque tube in the hull. All the joints of this control gear are readily accessible, as is also the countershaft in the hull, which is protected by a hinged cover from interference with the passengers.

Wing-tip floats, made of 17s aluminium alloy and weighing  $7\frac{1}{2}$  lbs. each, are fitted to the lower plane.

In designing the hull the main considerations were good seaworthiness and take off, and easy landing. Its lines are based in general on those of the Aeromarine model AMC hull (described in *FLIGHT* for Nov. 22, 1923), except that certain modifications and improvements gained from experience with the AMC hull have been incorporated. The most important of these is the pronounced V-bottom—the angle with the horizontal on each side of the keel being  $18^\circ$  at the step and  $28^\circ$  halfway from the step to the bow; from the step to the stern the angle is uniformly  $18^\circ$ . The rear portion of the hull has a slight upward sweep in order to bring the tail surfaces clear of the water and also to shorten the tail bracing. The large reserve of buoyancy provided and the upward sweep of the rear bottom give a rather short waterline, resulting in exceptional manoeuvrability. It has been found that the minimum turning radius in taxiing is about its own span (38 ft.), and that in turning, instead of burying its outer wing-tip float in the water—as often occurs with flying boats—

it banks itself towards the centre of the turn owing to the reaction effect on the sharp V-bottom.

In construction the hull is built up of 17s aluminium alloy sheets and stamped shapes. The framework consists of a series of frames and fore-and-aft stiffeners spaced to give the correct support to the sheet-metal covering, which is riveted to the framework. All the stiffeners and frames in the cockpit are of equal U-shape section, while the frames in the enclosed compartments are of Z section. The hull is divided into four watertight compartments, excluding the cockpit, and aluminium alloy tubes passing through these compartments carry the control cables without affecting their watertightness.

The seats are built in the hull permanently, and provide excellent comfort for pilot and two passengers. The pilot's seat is slightly forward of the passengers' seats. The view from the seats downwards and all round is excellent, although the top plane, naturally, somewhat restricts the view directly upwards.

In order to facilitate handling the boat on shore a watertight tube is provided across the hull just forward of the step to receive an axle and wheels, which may be seen *in situ* in the accompanying illustrations.

As previously stated, the complete power plant is assembled as one unit in a streamline nacelle. (The latter is built up of sheet 17s alloy, and carries the fitting for the attachments of the nacelle support struts, for lifting the machine, and for the attachment of the upper wings. A combined petrol and oil tank is located between two bulkheads in this nacelle, one of which is situated at each of the wing spar attachments. The oil section of this tank is placed immediately behind the front bulkhead, and serves to isolate the engine from the petrol supply. The petrol tank is divided into two parts, a service and an emergency section, and has a capacity of 25 gals., or sufficient for more than four hours' flying at full throttle.

The engine itself is bolted to the front bulkhead of the nacelle, which is of  $\frac{3}{16}$ -in. thick 17s alloy. The magneto, oil pump, and tachometer drive project inside the nacelle, where they are well protected from the elements. Short petrol piping under the nacelle connect the carburettor and petrol tank, while the cocks under the tank can be reached from the pilot's seat during flight. The tachometer, mounted on the side of the nacelle, and the oil gauge are both in full view of the pilot.

The following is a specification of the Aeromarine Model EO:—

Span (top) .. .. .	38 ft.
Span (bottom) .. .. .	34 ft.
Chord (top) .. .. .	5 ft.
Chord (bottom) .. .. .	3 ft.
O.A. length .. .. .	25 ft. 2 ins.
Angle of incidence .. .. .	$3.5^\circ$ – $5^\circ$
Dihedral (bottom) .. .. .	$3.5^\circ$
Area of main planes .. .. .	266 sq. ft.
Area of tail plane .. .. .	20.5 sq. ft.
Area of elevators .. .. .	12.1 sq. ft.
Area of rudder .. .. .	10 sq. ft.
Area of fin .. .. .	5.5 sq. ft.
Stagger (leading edges) .. .. .	3 ft. 5 ins.
Weight (empty) .. .. .	1,040 lbs.
Useful load .. .. .	710 lbs.
Weight loaded .. .. .	1,750 lbs.
Weight per h.p. .. .. .	23.3 lbs.
Weight per sq. ft. .. .. .	6.58 lbs.

## THE CAMBRIDGE UNIVERSITY AERONAUTICAL SOCIETY

The following is a list of lectures to be given before the Cambridge University Aeronautical Society during the Lent Term. The lectures take place at 8.30 p.m. in Lecture Room "D," Free School Lane, Cambridge:—

- January 21.—Professor B. Melvill Jones, M.A., A.F.R.Ae.S., A.F.C.: "Flying within Clouds."  
 January 28.—Professor L. Bairstow, F.R.S., C.B.E.: "The Aerofoil: a Search for a Theory."  
 February 4.—Wing-Commander Sholto Douglas, M.C., D.F.C., p.s.a.: "Air Fighting."  
 February 11.—W. S. Farren, Esq., M.A.: "The Process of Aeroplane Design."  
 February 18.—Air Chief-Marshal Sir H. M. Trenchard, Bart., G.C.B., D.S.O.: (Subject to be announced later).

- February 25.—H. Ricardo, Esq., M.A.: (Subject to be announced later).  
 March 4.—Alan Chorlton, Esq. (Managing Director of Messrs. Beardmore, Ltd.): "The All-Steel Aircraft."  
 March 11.—G. Bradshaw, Esq.: "The Failure of the Petrol Engine as a prime mover."  
 Presidential Address. Election of Officers.  
 (Date to be announced later.) Visit to the Airship R 33.  
 (Date to be announced later.) An exhibition of trick flying will take place.  
 (Date to be announced later.) If time permits four cinematograph films will be shown.

# AIR POWER AND WAR RIGHTS\*

"THE enthusiast is never quite to be trusted." We must thank Mr. Spaight for that phrase. He is obviously an enthusiast himself in the belief that in course of time—not necessarily in the next great war—fleets and armies will vanish and the issue will be decided by air forces alone. *FLIGHT* is *ex hypothesi* an enthusiast wherever aircraft is concerned, and so, we may presume, are most of our readers. We need not surrender our enthusiasms on account of that one phrase, but it is a useful reminder to all of us to give at least an attentive ear to arguments on the other side. On the first page of his most valuable book, Mr. Spaight writes:—"It is now a commonplace to say that the conquest of the air must mean as great a revolution as that brought about by the introduction of gunpowder or of steam." But he proceeds to argue that the introduction of air power is infinitely more revolutionary than the discovery of either of those methods of propulsion. Weapons have changed innumerable times in the history of warfare, but one does not invite much criticism by saying that all great wars "from Marathon to Waterloo in order categorical," and on to Mons in November, 1918, have been won by infantry adequately supported by ancillary services. The naval defence of an island kingdom may be put forward as an exception; but had the Armada effected a landing in England, that would not have won the war, unless the Spanish infantry had been able to master completely all the infantry which England could raise. Gunpowder and steam have not dislodged the infantry from their supreme position; but Mr. Spaight contends that air power has done, or shortly will do, so.

He argues that armies and fleets are but the champions, the armed instruments of the sovereign people. Aircraft can disregard them and strike straight at the will of the people. "It can begin where the old warfare all but left off." He quotes Marshal Foch and other authorities as admitting, not the certainty, but the possibility, that this may happen. If it does happen, then indeed the introduction of air power will be revolutionary. It will completely break the continuity of the history of war.

The question which all strategists, and indeed all who take an intelligent interest in the defence of their own country, must study is this. Is air power so completely revolutionary in very fact? After all the thousands of centuries during which mankind has fought, one principle has persisted—the supremacy of adequately-supported infantry. It has survived every invention of science and ingenuity, from the taming of the first horse to the development of tanks and modern artillery. Each of these inventions—if equitation can be called an invention—has been claimed by the enthusiasts of the day (but "the enthusiast is never quite to be trusted") as having sounded the knell of infantry supremacy; and in each case they were wrong. Have Orville Wright, Henri Farman and A. V. Roe at last succeeded where the Centaurs, Roger Bacon, Col. Shrapnel and the unknown deviser of tanks failed? It really looks as if they have done so, and that is why the word of caution quoted from page 30 of Mr. Spaight's book is so valuable.

Before proceeding with the review of this book, let us, as enthusiasts who value our reputation for trustworthiness, endeavour briefly to sum up the problem. An air force has this in common with a fleet, that it can strike and it can deal with communications, but it cannot occupy. Only land forces can occupy and consolidate. An air force differs from a fleet in that its blows can be delivered over land and sea alike. If an air force by its blows can so break the will to victory of a nation that the latter decides on surrender, even though its other forces are victorious, then the revolution alluded to above will have taken place. It is only fair, however, to quote military opinion (or at least one section of military opinion) which holds that once the armies are mobilised and on the move, the military victory will be held so important that the bulk of the opposing air forces will be obliged to leave civil populations alone and concentrate their energies on the lines of communication of the respective armies. If that proves correct, the revolution in warfare will not have taken place, and aircraft will be ranked with artillery, and for the matter of that with the Navy, as an arm ancillary to the infantry. Only experience can decide, and in the meantime each of us is entitled to stick to his own opinion.

\* By J. M. Spaight, author of *War Rights on Land*, and *Aircraft in War*. Longmans, Green and Co. 25s. net.

Mr. Spaight then proceeds to discuss whether aircraft are to be allowed an absolutely free hand in striking at civil populations. He quotes several opinions to the effect that this must be so, including Field-Marshal Sir William Robertson, and of Sir Frederick Sykes, and remarks that there is in one of the extracts "the candid expression of sentiments which would make a respectable Congolese shudder." But he takes comfort in the thought that two can play at the same game, and therefore it will not be to the advantage of either to begin it. "Let there be no mistake about it, unless air power is regulated and controlled, it will destroy civilisation itself." But, wisely and prudently controlled, "it can turn the old, crude, hideous blood-letting business into an almost bloodless surgery of forcible international adjustment."

The manner in which this idea is worked out is ingenious and almost convincing. The first essential is that the rules of international law must be framed wisely, and must not attempt to curb air power unduly. "It is necessary that international law should show itself ready to move with the times, to be practical, transigent, conciliatory in face of the new conditions, not precise, pedantic, obstructive." Rules which forbid reasonable latitude to air power will inevitably be disregarded; but the breach of them will cause indignation on the side which has suffered, will evoke a demand for reprisals, and if the demand is granted the whole fabric of international law will be shaken and probably shattered, with disastrous results to everyone. But, contends Mr. Spaight, reasonable rules will probably be observed in the main. Critics may exclaim that during the great War no rules could bind the Germans. Mr. Spaight examines the point, and quotes numerous instances to prove that no belligerent was absolutely indifferent to international law. There were several notorious and scandalous exceptions to the rule, such as the poison gas. But the use of the gas recoiled upon the Germans' own heads, and forms an excellent example of the un wisdom of breaking international law in time of war.

The object of air power is to break the *moral* of the enemy population. This, the writer contends, can be effected without mass slaughter. Resources may be destroyed with staggering effect, but without killing many civilians. He instances the City of London. It is all but uninhabited by night, and by night should be a legitimate target for aerial bombs. By day it ought to be immune. He quotes authority to show that bombing by night should be more accurate than day bombing. Such a rule should satisfy the demands of humanity on the one hand, and of air power on the other. Reasonable rules, such as this, would probably be respected from fear of counter measures if they were broken.

Article 24, para. (3), of the Air Warfare Rules drawn up at The Hague in 1923, is instanced as a rule which is certain to be disregarded with most probably disastrous clamours for reprisals. It runs:—

"The bombardment of cities, towns, villages, dwellings, or buildings not in the immediate neighbourhood of the operations of land forces is prohibited. In cases where the objectives specified in paragraph (2) are so situated that they cannot be bombarded without the indiscriminate bombardment of the civilian population, the aircraft must abstain from bombardment."

The writer holds that if munition factories are situated in the middle of a great city far from the operations of the armies (Birmingham occurs to the mind) it is worse than useless to forbid aircraft to bombard. It would be far wiser to permit bombardment by night. In any case the responsibility for the civilian casualties ought to lie on the country which so placed the factories, rather than on the airmen who act in accordance with the exigencies of war. If brought down during a night raid on such a place they should be entitled to honourable treatment as prisoners of war. Under the present rule it appears that they would have no such rights. Yet Germany established the right of submarine crews to such treatment.

Mr. Spaight finds another gleam of hope for the future in the revival of chivalry in connection with air fighting. Most forms of warfare have become so mechanised that chivalry has been stifled to death. But the most modern machine of all has brought about its revival. He tells a number of most interesting stories of chivalry on both sides.

† Paragraph (2) gives a list of legitimate military objectives, such as munition factories, lines of communication, etc.



Pilots often disregarded their rights under the customs of war, and made rules for themselves, which might have come straight from the pages of Froissart. In some cases pilots spared enemies who were at a disadvantage, and whom it was their duty to shoot down. Richthofen was once spared by a British pilot when the former's gun had jammed. Richthofen himself gave quarter to a British machine which he thought was in flames. The chivalrous spirit of the air personnel will, thinks the writer, be a powerful obstacle to the ruthless employment of air power against civilians.

The later chapters of the book deal chiefly with purely legal questions, such as the position of a pilot who is captured in enemy territory when carrying a civilian spy in his machine. Has he the rights of a combatant? or is he "tainted" by his dealings with the spy and therefore liable to be shot out of hand? The point is a novel one not previously contemplated

by international law, and the practice of belligerents, says the writer, must determine the custom of war. On the other hand, he does not hold it essential for a pilot or observer to be dressed in correct uniform when conducting warlike operations, provided that their aircraft is correctly marked. The anecdotes which serve as illustrations of different points are numerous and most interesting. The correct version of the story of the R.E.8, which landed with both pilot and observer dead in their seats, is given. So, too, is the story of the leaflets dropped over the Indian corps, which appealed to the Mussulmans in a script which only the Hindus could read. Mr. Spaight has read widely and deeply before he wrote this book. It is in the main a legal disquisition, but, despite that fact, many long passages provide as entertaining reading as one could desire. It is a book which ought to be possessed by every mess in the Royal Air Force.



### Air Actions in Iraq

LAST week we referred to R.A.F. action against Wahabi raiders in Iraq, and we now give some further information on the matter. *The Times* correspondent states that the aerial counter-attacks against the Wahabi raiders continued for four days, and it is worth noting that, whereas after the first attack by aeroplanes the Wahabis scattered and fled, leaving the stolen sheep and camels wandering aimlessly about the desert, on the subsequent occasions they were most tenacious, endeavouring to retain possession of the loot, which was left in the care of the rearguards. There were several separate raiding parties of Wahabis, whose attacks on two sectors of the frontier synchronised, whether by a definite plan or merely accidentally it is hard to say. In the course of the operations, as the Wahabis swiftly retreated towards their desert fastnesses, the aeroplanes were compelled to make longer and longer journeys from their base in the pursuit, but there were no British casualties.

### By Air to the Pole

YET another aerial expedition to the North Pole is being planned. This one is being organised by a young British Columbian explorer, Grettir Algareson, who will have as second in command Comdr. F. A. Worsley, D.S.O., of Shackleton fame. It is proposed to proceed this summer by way of Reykjavik to Spitzbergen, thence as far as the ice permits. A base will then be formed and the air journey to the pole undertaken from this point. A special machine, developed from the light plane, fitted with skii and floats is being designed for the attempt.

### Public Inquiry into Croydon Air Disaster

THE Air Ministry announces:—The Secretary of State for Air has directed a formal investigation of the accident at Croydon on December 24, 1924, to the aircraft G—EBBX, belonging to Imperial Airways, Ltd., to be held under the Air Navigation (Investigation of Accidents) Regulations, 1922. He has appointed Sir Arthur Colefax, K.B.E., K.C., to hold

the investigation, and Prof. B. M. Jones, A.F.C., Mond Professor of Aeronautical Engineering at Cambridge University, and Mr. James Swinburne, F.R.S., M.Inst.C.E., as assessors for the purposes of the investigation. The Court will hold its first sitting at the Law Courts in Quadrangle Court A at 11 a.m. on Friday, January 23. The investigation will be heard in open Court. Persons desirous of being heard by Council or otherwise should attend at the first sitting of the Court.

### Sir Charles Wakefield and King's College

COL. AND ALDERMAN SIR CHARLES WAKEFIELD, Bt., has been appointed on the King's College Delegacy by the University of London.

### "Joy Flips" for Wembley?

It is hoped that one of the features of this summer's exhibition at Wembley will consist of a display of British progress in aviation. The Society of British Aircraft Constructors are endeavouring to secure a section of the Palace of Engineering for the purpose of exhibiting a comprehensive selection of the products of the British aircraft industry. Also, it is hoped to arrange flights for visitors in large passenger machines from an aerodrome near by.

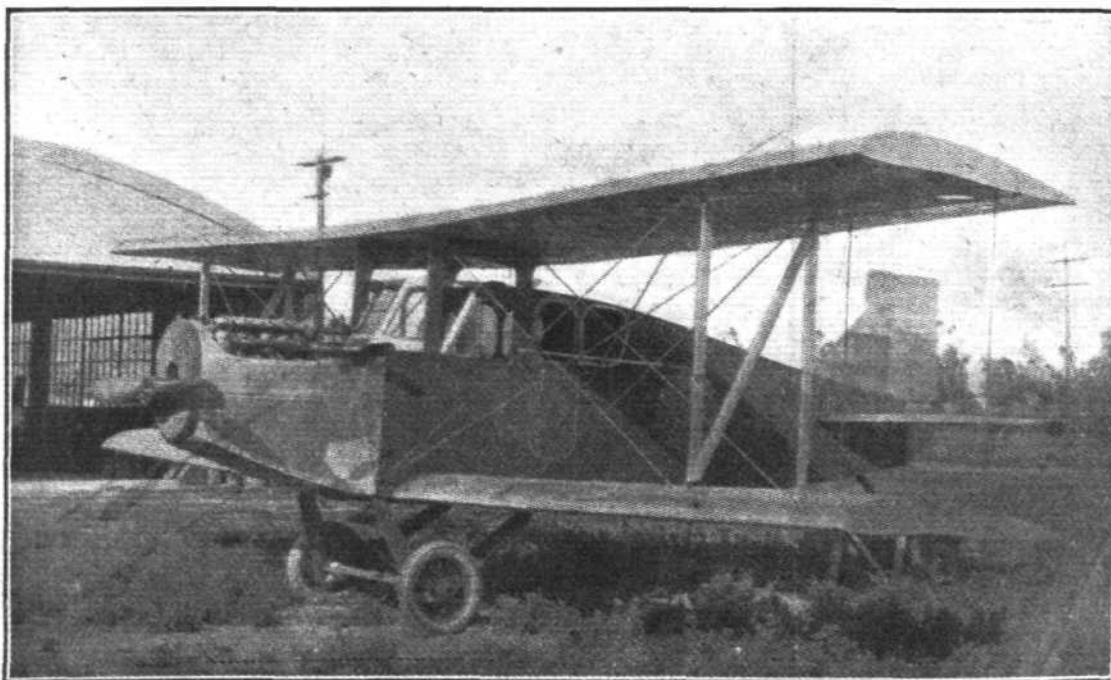
### Two R.A.F. Flying Accidents

THE Air Ministry regrets to announce two flying accidents, both occurring on January 17, resulting in the death of two R.A.F. pilots. In one case, as a result of an accident at Ramleh to a Bristol fighter of No. 14 (Army Co-operation) Squadron, Amman, Flying Officer Ronald Reid Hardcastle Bruce, the pilot of the aircraft, and No. 326113 L.A.C. Alex Sutton, were seriously injured. Flying Officer Bruce died at Palestine General Hospital on the same day.

The second accident occurred at Ismailia to a Bristol fighter of No. 208 (Army Co-operation) Squadron, Moascar, Ismailia, and Flying Officer James Alexander McLaren, M.C., the pilot of the aircraft, was killed.



An American Commercial Limousine: The Kinner 5-passenger biplane employed by Dr. T. C. Young, of Glendale, Cal. It is fitted with a 198 h.p. Renault engine.



# Personals

## Married

REGINALD LEE BATEMAN, R.A.F., was married on December 27, 1924, at Chelsea, to VERA MARY, younger daughter of the late Mr. and Mrs. WILLIAM JOHNSON.

HENRY CHARLES VINCENT JOLLEFF (R.A.F.) was married on January 5, at St. Nicholas Church, Pluckley, Kent, to IVY EWERETTA, youngest daughter of SIR THOMAS POLSON, K.B.E., C.M.G., and Mrs. Polson.

Flight-Lieut. ANTHONY LANDERDALE PAXTON, D.F.C., R.A.F., elder son of Mr. J. T. T. Paxton, of Little Menlo, Upper Norwood, and the late Mrs. Beatrice Paxton, was married on December 31, 1924, at Holy Trinity Church, Brompton Road, to PHYLLIS JOAN, youngest daughter of the late Mr. WILLIAM BRADFORD and Mrs. Bradford, of Merivale, Surbiton, Surrey.

## To be Married

The engagement is announced between Capt. W. H. E. CAMPBELL, A.F.C., only son of the late Sir Walter Campbell, K.C.V.O., and Lady Campbell, of 64, Belgrave Road, London, S.W., and AURIOL, third daughter of Sir HENRY GRAYSON, Bt., K.B.E., and Lady Grayson, of Ravens Point, Anglesey, and Crossways, Hook Heath, Woking.

The engagement is announced between Mr. F. J. S. SHORT, R.A.F., son of the late Frederick Short, of Sunderland, and Mrs. Short, and PHYLLIS ADA, only child of Mr. and Mrs. J. E. CHURCHILL, Thorndean, Swingfield, near Dover.

The marriage of the Rev. H. D. L. VIENER, Chaplain-in-Chief, R.A.F., with Miss V. M. KEATCH, will take place very quietly on February 23 at Christ Church, Mayfair, the Bishop of London officiating.

## MAJ. ZANNI ON THE NAPIER ENGINE

WE feel sure our readers will be interested in the following letter received by Messrs. Napier and Son, Ltd., from Maj. Zanni, who made such an excellent effort to fly round the world last year on a Napier "Lion" engined Fokker. Maj. Zanni, it will be remembered, got as far as Tokio—approximately 10,000 miles in 22 days' flying. The letter runs as follows:—

"I thank you very much for your congratulations and the kind remarks contained in your letter of October 20.

"I am glad that my experiment with your 450 h.p. 'Lion' was such a good one, and I must say that from the very beginning of my flight I started congratulating myself on having selected a Napier engine to carry me along. I could not have made a better choice, and I fully recognise the good reasons that prompted you to affirm that it is the best in the world.

"My first engine, the one that brought me along from Amsterdam to Hanoi, was really a fine specimen of trustworthiness and reliability, and when I had to part with it—simply because my other machine sent to me from Japan had already a Napier engine mounted—it felt like parting with one's best friend. Beltrame (my mechanic) was absolutely delighted with it, and was very sorry that it could not accompany us on to Japan, as he was sure it would have lasted all the way, and more, if necessary, because after the accident at Hanoi, with the aid of personnel of the French Aviation corps stationed there, he dismantled the engine and found that it was in perfect condition still and without any apparent change from the day you delivered it, despite having flown for 105 hours through sandstorms, the most appalling rain imaginable, which came down just like a curtain, and most of the time through a heat that was too awful for words. These were, unfortunately, the conditions in which I had to fly. The French aviators at Hanoi found it hard to believe that my engine had flown 105 hours. If I had not started too late, owing to the illness of my navigator, who eventually had to stay behind, I think the accident at Hanoi would not have happened, as the conditions would have been good instead of finding myself flying over lakes instead of earth (caused by torrential rains), and I have no doubt that the engine would have lasted very well up to Japan.

"It may interest you to know that some days ago the Japanese Imperial Aeronautical Association asked me to give a lecture relating my experiences during the flight, the organisation of it, and any interesting features of same, as they intend to make a Round-the-World flight also. It was attended by many naval and military staff officers, pilots of both arms, directors of civil aviation, etc., etc., and in the course of my dissertation, when referring to the accident at Hanoi, I felt bound to declare publicly the following con-

cerning my engine: 'On dismantling the first engine, which had worked altogether 105 hours without having been at any moment touched, it showed that it was still in excellent condition and as if it had just left the manufacturers' works, causing very eulogistic remarks to be made by the experts of the French Aviation Corps stationed there.' At the end of the lecture, when I was dealing with the experience derived from the material used in my flight, I stated: 'With reference to the types of machine and engine used by us, these have given proofs, more than enough, of their exceptional qualities. As I have already stated, the first engine was dismantled after 105 hours' flight, during which period not one single part of the said engine was touched, and it was found as if it had just started to work for the first time. The second engine, in 40 hours of flight, from Hanoi to Kasumigaura, responded in every way to what was expected of it.' At the beginning of the lecture I had said, when describing the steps taken to choose the engine and machine to be used in the flight, that 'we decided to employ Napier engines, "Lion" type, standard, of 450 h.p., because after the tests to which these had been submitted in our presence no doubt remained in our minds.'

"As you will note, I confirmed publicly my telegram to you, which read: 'Very delighted state two Napier engines worked admirably until now without slightest indication trouble or wear and without necessity change or touch parts,' and I am glad to state also that my lecture is to be published in the form of a pamphlet and distributed throughout the services.

"Of course, we had very little time to dedicate to the engine or to look at it, as it was a case of arriving at a place in the afternoon and off next day early, and then very seldom had we any hangar accommodation to protect the engine and machine.

"After the accident I sent the engine on to Japan, where it is now, and I shall send it forward as a spare engine to be used in case of necessity.

"The second engine, the one fitted on the hydroplane, which brought me along from Hanoi to Kasumigaura, has flown so far for 40 hours, and during this time it worked just as magnificently as the first one. I am trusting on this one to take me across the Pacific.

"Unfortunately, I got to Japan so late in the year that I could not get ships to lay the provisions and fuel along the course, as the owners would not venture their steamers beyond a certain latitude in the winter because they were convinced that most of the ports and places that I had to touch were frozen. I endeavoured by all means to get the ships, but had eventually to give it up and resign myself to interrupt the flight until next spring—I think I shall be starting some time in May, if not in April."

## Japanese Air Lines

APPLICATION has been made by the Nippon Aviation Co. for permits to operate an air mail and passenger service between Osaka and Fukuoka. The machines used will have engines of 260 h.p. and will be built in Japan. An air service between Osaka and Tokio is also contemplated.

## French Decoration for R.A.F. Pilot

H.M. THE KING has given Flying Officer Robert Collins, Royal Air Force, authority to wear the Médaille Commémorative Française de la Grande Guerre, conferred on him by the President of the French Republic, in recognition of services rendered as an Engagé Volontaire in the French Air Service.



# THE ROYAL AIR FORCE

London Gazette, January 13, 1925

## General Duties Branch

The following are granted short service commissions in the ranks stated, with effect from, and with seniority of, the dates indicated:—*Flying Officers (for Seven Years on the Active List)*.—G. L. Gandy (Lieut., R.N., ret'd.), P. Hill (Lieut., Indian Army, ret'd.), C. G. C. Woledge (Lieut., Indian Army, ret'd.); Jan. 6. *Pilot Officers on Probation (for Five Years on the Active List)*.—K. C. Baker, G. S. J. Bowman, W. F. Bryanton, P. B. Chubb, P. K. Copperthwaite, G. W. Cripps, E. J. Ellis, T. P. F. Fagan, H. D. Gunton, A. E. Hamilton, F. S. Homersham, D.C.M., M.M., J. A. E. Inkster, L. B. McGovern, G. P. Mee, B. E. Moody, G. M. E. Shaw, D. C. Sherman, W. A. Shorten, V. J. Sofiano, E. G. D. Stewart, M.C., A. C. Watkins, E. T. Wiltshire; Jan. 6. H. A. Evans-Evans, C. W. Woodbyrne; Jan. 7.

The following Pilot Officers are promoted to rank of Flying Officer:—J. E. Tomes; Dec. 5, 1924. R. T. Taaffe; Dec. 14, 1924. Flight Lieut. D. Gilley, D.F.C., is placed on half pay, Scale B; Jan. 11. Squadron Leader W. D. Long, O.B.E., is re-seconded for duty with the Egyptian Government; Jan. 1. Flight Lieut. E. J. Webster, D.F.C., is transferred to Reserve, Class A. Jan. 11. Flight Lieut. R. F. L. Dickey, D.S.C., resigns his permanent com-

mission; Jan. 14. Pilot Officer H. St. E. Dracott resigns his short service commission; Jan. 14. Flying Officer T. C. Dodd relinquishes his short service commission on account of ill-health; Jan. 14.

## Stores Branch

Flight Lieut. A. G. Knight, M.B.E., is granted a permanent commission in the rank stated; Jan. 14.

## Accountant Branch

The following Flying Officers are transferred to Reserve, Class C (Jan. 15):—C. E. Treadgold, B. C. Powell.

## Reserve of Air Force Officers

M. H. Findlay, D.S.C., D.F.C., is granted a commission in Class A, General Duties Branch, as a Flying Officer on probation; Jan. 13. The following Pilot Officers are promoted to rank of Flying Officer:—H. B. Elwell; Dec. 2, 1924, with seniority of Oct. 21, 1924. V. Vickers; Oct. 21, 1924. W. Dougall; Oct. 21, 1924. S. B. Atkinson; Dec. 2, 1924. H. S. Howard; Jan. 6. Flying Officer E. B. Wilson is transferred from Class A to Class B; Jan. 13. Flying Officer E. O'C. Parsons is transferred from Class A to Class C; Jan. 13.

## A CLIP WITH A GRIP

### The "Jubilee" Worm-Drive Hose Clip

MANY are the types of clip that have been evolved for the purpose of securing a length of flexible hose, such as rubber tubing, to a metal pipe, and it might have been thought that by now a stage had been reached when little further progress might be expected in this direction. This is probably taken for granted by the majority of people, but, as in so many instances before, the majority of people were wrong. We frankly admit that until recently we had shared that opinion, but a visit to our offices by Eng.-Lieut. L. Robinson convinced us that the hose clip is not yet as widely known as it deserves to be, at any rate in aircraft circles. The clip designed by Mr. Robinson is, as a matter of fact, widely used in other branches of engineering, and by some of our aero engine manufacturers, but its applications are almost unlimited.

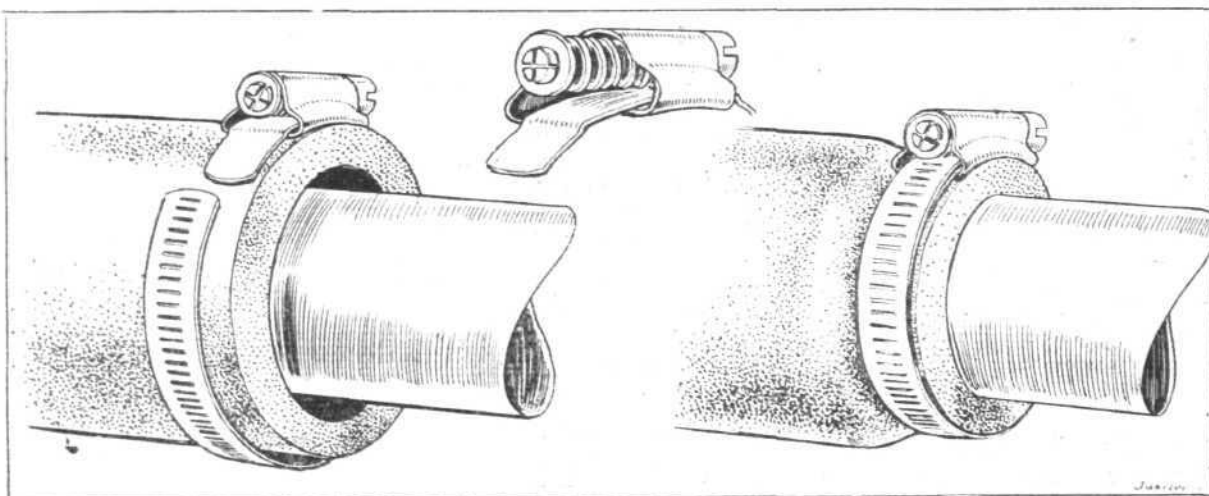
Like so many great inventions, the "Jubilee" hose clip is extremely simple in principle, and it has the further advantage

when we state that it was found possible to tighten up the clip with nothing more formidable in the way of a tool than a shilling piece!

As an instance of the strength of the "Jubilee" clip, we may mention that we have seen one of these clips tightened up by two strong men turning a screwdriver until the rubber tubing was compressed as much as the force applied would allow. When released the clip showed no signs whatever of having been brought anywhere near breaking point. We believe there is on record a case of a man having broken one of these clips by putting it in a vice and turning the worm with a screwdriver fitted with a long cross-handle, but short of any such treatment the "Jubilee" appears to be unbreakable.

The principle upon which the clip works is simple enough in all conscience, and will be understood from the illustrations. A galvanized steel strip has cut across portion of its face a series of slots, or rather notches, as they do not go

"Some Clip": The "Jubilee" clip works on the worm-gear principle, and, as shown in this sketch, even a greatly over-size tube is brought into perfectly close contact with the pipe. The clip has been accepted by the Air Ministry for use on aircraft.



of being very neat in appearance, as the accompanying sketches will show. It is also capable of exerting a tremendous pressure, and, what is even more important, an even pressure all round a tube. To take an example, in the specimen from which the sketches were made the metal pipe had a diameter of  $1\frac{1}{2}$  in., the inner diameter of the rubber tubing being about  $1\frac{3}{4}$  in. and the thickness of the walls of the rubber tube  $\frac{1}{4}$  in. Thus it will be seen that the rubber tube was vastly over size. In spite of this fact, however, the "Jubilee" clip contracted the rubber evenly and brought it into firm contact with the metal pipe all around, without a trace of a "bulge" at any point. Normally, of course, tube and pipe would be more nearly of proper relative size, but the specimen did demonstrate that for a temporary job, when the right size rubber tubing does not happen to be available, the "Jubilee" will make a very sound joint until such time as the proper size tubing can be obtained. That no great force is required to lock the clip will be realised

right through the strip, and engaging with these is a worm supported in a stamped cage. This cage is very stiff, so that there is no tendency for the worm to jump out of the slots in the strip when pressure is exerted. The result of the worm drive is that a "gearing down" action is produced, so that for a very small force on the worm a strong pull is exerted on the steel strip.

The "Jubilee" clip is manufactured by Messrs. L. Robinson and Co., of London Chambers, Gillingham, Kent, in four standard sizes for the following outside diameter hose:—No. 1,  $\frac{7}{8}$  to  $1\frac{1}{2}$  in.; No. 2 for  $1\frac{1}{2}$  to  $2\frac{1}{4}$  ins.; No. 3 for 2 to  $2\frac{3}{4}$  ins.; and No. 4 for  $2\frac{3}{4}$  to  $3\frac{1}{4}$  ins. For larger sizes two or more clips can be joined together, and one can even conceive of temporary aircraft repairs to broken struts, etc., being effected in the field by the use of these clips. They have, we are informed, been passed by the Air Ministry for their legitimate purpose, but they could be used in a variety of other ways.

## NOTICES TO AIRMEN

### Aerodrome Boundary Lights

RED boundary lights have been installed and are in constant operation at Croydon, Lympne, Penshurst and Littlestone.

These lights indicate the area within which aircraft can land and manoeuvre on the ground in safety.

The focal height of the lights varies, with a minimum of 6 ft., and each light exhibits a flashing character every second, thus:—Flash, 0.1 sec.; eclipse, 0.9 sec.

*Air Pilot*.—An amendment to the air pilot accordingly will be notified in due course.

(No. 3 of 1925.)

### AERIAL PHOTOGRAPHY

No doubt there are many of our readers who have little idea of the amount of work that is undertaken in this country in the way of aerial photography. As a matter of fact, a considerable amount of business is being done in this connection from time to time, as may be gathered from the following work done by Aerofilms, Ltd., of the London Aerodrome, Hendon, N.W.9, who have during the early part of last week carried out a number of aerial photographic flights, when orders were executed.

Two of the locations photographed are worthy of mention, the first being a newly constructed sewage farm at Reading, alongside of the old installation, which effectively illustrated the details of the new plant and the small amount of ground space taken up as compared with the old plant, even although provision has been made to deal with the sewage, allowing for the growth of the population for the next 20 years.

Secondly, oblique views were secured along the various sections of the new road, just completed, between Ilford and Southend, which at an early date is to be opened by H.R.H. the Prince of Wales. These records, which show its course, road surface and surrounding districts, have been secured for the contractors for publicity purposes.

It is interesting to hear that, when flying over the flooded areas of the Thames, the photographer and pilot report that a distinct odour was noticeable, and a ground mist could be seen stretching over the whole area. Other factories at Barking and district were photographed, which will be used by the firms for illustration purposes in their forthcoming catalogues and publications. Capt. Broad, of the De Havilland Aircraft Co., carried out the flying for Messrs. Aerofilms.

We hope on future occasions to give further details in *FLIGHT* of the work carried out by this firm.

### IMPORTS AND EXPORTS, 1923-1924.

AEROPLANES, airships, balloons and parts thereof (not shown separately before 1910). For 1910 and 1911 figures see "FLIGHT" for January 25, 1912; for 1912 and 1913, see "FLIGHT" for January 17, 1914; for 1914, see "FLIGHT" for January 15, 1915; for 1915, see "FLIGHT" for January 13, 1916; for 1916, see "FLIGHT" for January 11, 1917; for 1917, see "FLIGHT" for January 24, 1918; for 1918, see "FLIGHT" for January 16, 1919; for 1919, see "FLIGHT" for January 22, 1920; for 1920, see "FLIGHT" for January 13, 1921; for 1921, see "FLIGHT" for January 19, 1922; for 1922 see "FLIGHT" for January 18, 1923; and for 1923, see "FLIGHT" for January 17, 1924.

	Imports.		Exports.		Re-Exports.	
	1923.	1924.	1923.	1924.	1923.	1924.
Jan. ..	466	2,213	60,079	52,239	280	2,219
Feb. ..	641	920	120,236	26,349	3,040	335
Mar. ..	589	11,381	71,945	34,113	689	509
Apr. ..	8,508	373	167,757	56,998	462	6,014
May. ..	845	3,426	55,427	125,138	728	4,162
June	1,433	1,219	141,381	87,629	1,410	2,115
July. ..	192	1,510	62,025	179,292	1,334	2,708
Aug. ..	2,054	687	57,704	247,982	344	950
Sept. ..	578	4,383	39,069	67,749	106	641
Oct. ..	705	2,715	80,002	143,512	8,274	3,743
Nov. ..	1,246	2,349	55,001	100,505	250	1,007
Dec. ..	918	108	97,295	90,172	108	24
	18,175	31,284	1,007,699	1,211,678	17,025	24,427

### Institute of Aeronautical Engineers

We are requested to notify our readers that the paper to be read before the Institute of Aeronautical Engineers by Prof. Coker on "Photo-Elastic Methods of Measuring Stress" will be given on February 20 instead of February 6 as originally announced.

### SIDE-WIND

OWING to the reorganisation of the factory control at S. Smith and Sons (M.A.), Ltd., of Cricklewood, London, N.W.2, Mr. J. W. Dumbrell, foreman of the aviation instrument section, has now severed his connection with "Smiths." Mr. Dumbrell has been associated with "Smiths" for some years, during which time he has proved himself a highly skilled and efficient worker. He is now desirous to take up a new position, and if any of our readers can offer him one he would be obliged if they would communicate with him at 32, Fentiman Road, Clapham Road, S.W.8; or letters addressed to S. Smith and Sons, Ltd., would be forwarded.

### PUBLICATIONS RECEIVED

*Abhandlungen aus dem Aerodynamischen Institut an der Technischen Hochschule, Aachen, Germany.*

*Aeronautical Research Committee, Reports and Memoranda: No. 919 (Ae. 145).—The Effect of Wind Tunnel Interference on a Combination of Airscrew and Tractor Body.* By C. N. H. Lock and H. Bateman. April, 1924. Price 9d. net. No. 924 (Ae. 147).—*Lateral Force and Moments on Avro Model.* By R. G. Harris and A. S. Hartshorn. April, 1924. Price 6d. net. H.M. Stationery Office, Kingsway, London, W.C.2.

*Air Ministry Meteorological Office: Professional Notes: Vol. III, No. 36. On the Inter-Relation of Wind Direction with Cloud Amount and Visibility at Cahirciveen, Co. Kerry.* By L. H. G. Dines and P. I. Mulholland. H.M. Stationery Office, Kingsway, London, W.C.2. Price 1s. net.

*Automobile Engines.* By A. W. Judge. Chapman and Hall, Ltd., 11, Henrietta Street, London, W.C.2. Price 4s. net.

*Calendar, 1925.* The Chloride Electrical Storage Co., Ltd., Clifton Junction, Manchester.

*Notiziario di Aeronautica, No. 12. December, 1924.* Commissariato dell'Aeronautica. R. Accademia Nazionale dei Lincei, Rome.

*Rendiconti Tecnici della Direzione Superiore del Genio e delle Costruzioni Aeronautiche.* December 15, 1924. Commissariato dell'Aeronautica, R. Accademia Nazionale dei Lincei, Rome.

*The Military Uses of Astronomy.* By Major F. C. Molesworth. London: Longmans, Green and Co., Ltd. Price 3s. 6d. net.

*Winter Time-Tables and Freight Rates.* Imperial Airways, Ltd., Croydon Aerodrome, Surrey.

### AERONAUTICAL PATENT SPECIFICATIONS

Abbreviations: Cyl. = cylinder; i.c. = internal combustion; m. = motor. The numbers in brackets are those under which the Specifications will be printed and abridged, etc.

#### APPLIED FOR IN 1923

Published January 22, 1925

- 23,463. P. MAGNI. Variable fluid-dynamic wings, such as for aeroplanes. (209,031.)  
23,831. C. J. LAKE. Hydro-aeroplanes. (226,603.)  
26,240. F. L. M. BOOTHBY. Airships. (226,637.)

## FLIGHT

The Aircraft Engineer and Airships

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